CRES CENTER FOR RESEARCH, INC. · ENGINEERING SCIENCE DIVISION
THE UNIVERSITY OF KANSAS · LAWRENCE, KANSAS · 66044

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National Aeronautics and Space Administration
Office of University Affairs
Washington, D. C. 20546

Attention: (Miss) Winnie M. Morgan
Technical Reports Officer

Ref: NASA Research Grant Y NGR-17-004-013

Subject: Status Report for the Period Junuary 15, 1967 thru July 15, 1967.

The above reporting period is modified by the fact the grant was not awarded until early in May, 1967. Consequently, the activities described actually span only the interval of May 1, 1967 thru July 15, 1967. The next reporting period will cover more technical details of the work performed.

The first step in the study program was to establish a study group of expert consultants with both interest and experience in the field of deep space communications. During May The University of Kansas together with NASA/ERC contacted all known government agencies and academic institutions with interests in this area. Individuals representing these agencies and institutions that expressed interest in contributing to this study were then invited to attend an initial meeting held at NASA/ERC June 7, 1967. A list of other attendees of the June 7 meeting is attached.

Although it is expected that the major effort of this study will be in the area of large arrays of small elements some members of the study group were deliberately selected for their interest and association with large steerable paraboloids. This was done to insure that the capabilities and costs of existing and possible future systems composed of arrays of large paraboloids would be available to the group for comparison with the small element array techniques investigated.

At the June 7 meeting the initial goals of the study group were formulated. Briefly, it is the purpose of this committee to study large--10^4 square meter or larger--ground based antennas for use in deep space communications systems. As a result of this study recommendations are to be made to NASA as to techniques which should be pursued. These recommendations are to be aimed at developing the components and techniques that would be necessary for a design which might be started in approximately ten years.

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Possible configurations an aperture of this size might take are: (1) a single large steerable paraboloid, (2) an array of smaller paraboloids, and (3) an array of small elements.

Other organizations such as the Jet Propulsion Laboratory have been involved in the design and development of large paraboloids and will undoubtedly continue to pursue this area of investigation. This committee will then concentrate upon the study of large arrays. It will, of course, be necessary to be quite familiar with the capabilities and costs of the large reflectors in order to make valid cost comparisons with array techniques.

Each participant at the meeting gave a summary of his experience with large antennas and the state of the projects with which he was connected. From these reports it was readily apparent that the large area-small element array is not now competitive with the large steerable paraboloids, such as the 210 foot diameter dish at Goldstone. However, the rapid technological advances in the performance of array elements, phase shifters, receivers, etc. coupled with decreased cost was likewise pointed out. The purpose of this study, then, is to enable NASA to direct research into areas which may make available components or techniques that will permit a large array to be a competitive aperture for consideration as a high data rate antenna in approximately ten years.

Since the time of this meeting the participant replies have been evaluated and assignments for investigative areas have been made. A sub-contract to Professor Curt Levis of The Ohio State University Electro-Science Laboratory is in preparation at CRES.

Another meeting of the full study group will be scheduled in the early fall or as soon as sufficient results from the studies now underway dictate.

Louis L. Bailin
Chairman, Department of
Electrical Engineering

attach.

LIST OF PANEL MEMBERS FOR LARGE ARRAY STUDY

*1. Richard Baker
MIT Space Sciences Center
Cambridge, Mass.

2. Carl Blake
MIT Lincoln Laboratory
Lexington, Mass.

*3. William F. Croswell
NASA/Langley Research Center
Langley Station
Hampton, Va. 23365

4. W. Erickson
Dept. of Physics and Astronomy
University of Maryland
College Park, Maryland 20740

5. J. V. Harrington
MIT Space Sciences Center
Cambridge, Mass.

*6. Akira Ishimaru
Elect. Engr. Dept.
University of Washington
Seattle, Washington

*7. Curt A. Levis
Antenna Laboratory
Ohio State University
1320 Kinnear Road
Columbus, Ohio 43212

*8. Philip D. Potter
Mgr. Commercial Elect. Research Sect.
Jet Propulsion Laboratory
Cal-Tech, 4800 Oak Grove
Pasadena, California

9. George W. Swenson
National Radio Astronomy Observatory
Edgemont Road
Charlottesville, Va.

*Attended June 7 Organizational Meeting.

ADDITIONAL ATTENDEES AT JUNE 7 MEETING

Dr. Louis L. Bailin
Department of Electrical Engineering
The University of Kansas
Lawrence, Kansas

Dr. David M. Bernella
MIT Lincoln Laboratory
Lexington, Massachusetts

Dr. Keigo Iizuka
NASA/ERC
575 Technology Square
Cambridge, Mass. 02139

Dr. Ralph D. Kodis
NASA/ERC
575 Technology Square
Cambridge, Mass. 02139

Mr. Francis LaRussa
NASA/ERC
575 Technology Square
Cambridge, Mass. 02139

Dr. Robert Mailloux
NASA/ERC
575 Technology Square
Cambridge, Mass. 02139

Mr. William P. Waite
CRES - Marvin Hall
The University of Kansas
Lawrence, Kansas 66044